Short Communication

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# Body Weight Reduction Program for Metabolic Syndrome

## —Evaluation of Effect after One-year-Intervention—

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**Abstract**

We organized a 180-day-long body weight reduction program for metabolic syndrome (so called, HALSMA diet program) for 37 male workers (30 to 49 years old) who were diagnosed as metabolic syndrome by the annual health check-up. After 1 year, the intervention group showed a statistically significant improvement for the following items; body weight, BMI, body fat rate, waist circumference, blood pressure, dyslipidemia, liver function, and glucose tolerance. For the comparison of two groups after 1 year, the intervention group showed a statistically significant improvement for body weight, BMI, AST, $\gamma$-GPT, FBS, HbA1c, and insulin level. According to our results, it is indicated that self-measurement and periodical brief personal contact provided significant benefit in sustaining weight loss.

Key words: metabolic syndrome, visceral fat, body weight reduction program

## ❖ Introduction

According to the Law of the medical services for the aged, a new health promotion program, so called "health checkups and healthcare advice with a particular focus on the metabolic syndrome" program was introduced on April 2008[1)]. All insured between 40 and 74 receive the health check up for visceral fat (measured by waist circumference), hypertension, hyperglycemia and dyslipidemia. The most risky group, so called "active assistance necessary" must receive the visceral fat reducing health program for three to six months. The main target of this new health screening program is so called metabolic syndrome.

Considering the recent increase of obesity prevalence in Japan, the social value of the new program must be positively evaluated. However, there are many critics about the effectiveness and appropriateness of this program because of very few evidences to promote it. According to the Occupational Safety and Health Law, the annual health check up and following health education has been organized in the Japanese occupational setting. The new law requires for the occupational setting to harmonize its health check up program with the new health promotion. The occupational setting is expected to contribute for the accumulation of findings that will be useful for discussion about appropriateness and effectiveness of new framework[1)–3)].

In this literature, we will explain the effectiveness of our program for metabolic syndrome in an occupational setting.

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## ❖ Studied Population and Method

### *1. Studied population*

We recruited 68 male workers (30 to 49 years old) of an electronic company in the Kanto Region, Japan.

They received the annual health check up under the Occupational Safety and Health (OSH) Law during April to June 2006. These persons were evaluated as "health education necessary" according to the inclusion criteria set by Ministry of Health, Labor and Welfare (MHLW). After the explanation of research purpose, we obtained written consent from the participants. Among 68 persons, 37 persons (42.2 ± 4.5 years old) were allocated to intervention group and another 31 groups (42.1 ± 4.8 years old) were allocated to control group.

### 2. Method

The intervention continued for 180 days. The intervention group was required to reduce their weight for 5 to 7% during the initial 90 days and to maintain this reduced level during the following 90 days.

The intervention group received the standardized health education. In this health education, the occupational physician explain the concept of metabolic syndrome and its risk for developing cardio-vascular diseases and then the public health nurse helped each person to establish his plan for reducing body weight. Each participant was required to establish the three behavioral rules using the 100 kcal card. The 100 kcal card is the card that explains what activity or food is equivalent to 100 kcal with caricature. Each participant was required to measure his body weight twice a day (morning and evening), to wear the pedometer and to register the results with some self-comment on health diary. The participant sent the results to public health nurse periodically (every 10 days for the first 90 days, and every 30 days for the second 90 days). The public health nurse responded to this e-mail with comments and advices. If a participant was evaluated as his goal is too much difficult to attain, the modification of plan was recommended by public health nurse and reestablished the plan by on-site consultation.

For the control group, the occupational physicians explained the necessity of body weight reduction by leaflet.

The effect of intervention was evaluated by body weight, Body Mass Index, body fat rate, Systolic Blood Pressure, Diastolic Blood Pressure, Waist circumference, AST, ALT, GGT, FBS, HbA1c, and insulin secretion. The intervention group and control group were compared at the beginning, after 90 days, after 180 days and after 1 years.

All statistical analyses were conducted by SPSS 12.0J.

## ❖ Results

Table 1 shows the comparison of two groups at the beginning and after two years. At the beginning there were no differences between the two groups except for insulin secretion level.

After 1 year, the intervention group showed a statistically significant improvement for the following items; body weight (78.7→74.5), BMI (26.5→25.2), body fat rate (26.7→24.3), waist circumference (90.9→87.0), SBP (129.8→123.1), DBP (84.2→81.8), TG (221.8→172.9), HDL-cholesterol (49.2→52.9), AST (27.2→22.4), ALT (42.1→29.8), $\gamma$-GPT (85.2→59.1), Fasted Blood Sugar (110.6→106.4), HbA1c (5.5→5.4), and insulin (9.0→7.4).

For the comparison of two groups after 1 year, the intervention group showed a statistically significant improvement for body weight, BMI, AST, $\gamma$-GPT, FBS, HbA1c, and insulin (Table 2). As a result, 27 persons (73.0%) and 12 persons (38.7%) were recovered from metabolic syndrome among the intervention group and control group, respectively (Figure 1).

## ❖ Discussion

The present results suggested the effectiveness of our new program for metabolic syndrome. It is very interesting that the statistically significant effectiveness was observed for the intervention group 6 months after the end of intervention. The metabolic syndrome is the results of unhealthy life-style for the long period. In order to recover from this situation, one must be motivated to change one's behavior. In order to facilitate this process, we help the participant to determine one's goal of behavioral change by oneself and support him to continue the chosen healthy life-style by the continuous monitoring. The base theory is the self-efficacy model[4]. We consider that self-measurement of body weight and pedometer, self reporting the performance and continuous support from the health professionals are key success points of our program. Svetkey et al. have also reported the similar effect and importance of monthly brief personal contact[5]. According to their results, the majority of individuals who successfully completed an initial behavioral weight loss program maintained a weight below their

Table 1 Comparison of data between the two groups

| | Interention group (n=37) | | Control group (n=31) | |
|---|---|---|---|---|
| | at the begonning | after 1 year | at the begonning | after 1 year |
| Age | 42.2 ± 4.5 | | 42.1 ± 4.8 | |
| Body weight (Kg) | 78.7 ± 11.5 | 74.5 ± 11.0* | 75.6 ± 6.3 | 75.4 ± 6.9 |
| BMI | 26.5 ± 3.0 | 25.2 ± 3.1** | 26.0 ± 2.1 | 26.0 ± 2.2 |
| Body fat rate (%) | 26.7 ± 4.0 | 24.3 ± 4.6** | 25.7 ± 4.1 | 26.0 ± 4.5 |
| Waist (cm) | 90.9 ± 6.8 | 87.0 ± 7.6** | 90.3 ± 4.7 | 89.8 ± 5.3 |
| SBP (mmHg) | 129.8 ± 9.7 | 123.1 ± 9.4** | 130.3 ± 10.3 | 128.8 ± 10.3 |
| DBP (mmHg) | 84.2 ± 7.0 | 81.8 ± 6.8* | 83.3 ± 6.4 | 83.9 ± 7.0 |
| TC (mg/dl) | 209.2 ± 32.6 | 215.9 ± 56.5 | 204.1 ± 27.9 | 202.4 ± 27.3 |
| TG (mg/dl) | 221.8 ± 68.0 | 172.9 ± 110.3** | 228.8 ± 116.6 | 188.4 ± 107.2* |
| HDL (mg/dl) | 49.2 ± 10.7 | 52.9 ± 12.1** | 48.7 ± 12.5 | 50.7 ± 13.5* |
| LDL (mg/dl) | 128.7 ± 28.8 | 128.7 ± 27.0 | 123.9 ± 25.3 | 126.8 ± 23.3 |
| AST (U/l) | 27.2 ± 9.0 | 22.4 ± 6.9** | 25.0 ± 9.1 | 24.6 ± 9.3 |
| ALT (U/l) | 42.1 ± 27.1 | 29.8 ± 17.8** | 40.3 ± 22.4 | 37.7 ± 23.4 |
| GGT (U/l) | 85.2 ± 59.6 | 59.1 ± 33.8** | 74.7 ± 62.4 | 77.1 ± 69.2 |
| FBS (mg/dl) | 110.6 ± 13.7 | 106.4 ± 12.5* | 112.9 ± 16.0 | 115.4 ± 21.0 |
| HbA1c (%) | 5.5 ± 0.4 | 5.4 ± 0.4** | 5.6 ± 0.5 | 5.7 ± 0.6 |
| Insulin | 9.0 ± 3.8 | 7.4 ± 3.6** | 7.1 ± 3.0 | 8.6 ± 4.2 |

*p<0.05, **p<0.01.

Table 2 Comparison of effects between the two groups

| | Intervention group | Control group |
|---|---|---|
| Body weight (kg)** | 4.2 ± 3.2 | 0.2 ± 2.5 |
| BMI** | 1.3 ± 1.0 | 0.1 ± 0.8 |
| Body fat rate (%)** | 2.4 ± 2.4 | –0.3 ± 2.1 |
| Waist (cm)** | 3.8 ± 4.2 | 0.5 ± 2.7 |
| SBP (mmHg)* | 6.7 ± 10.1 | 1.5 ± 11.3 |
| DBP (mmHg)* | 2.5 ± 5.6 | –0.6 ± 6.8 |
| TC (mg/dl) | 36.3 ± 107.4 | 15.6 ± 106.3 |
| TG (mg/dl) | 48.8 ± 98.0 | 40.4 ± 94.4 |
| HDL (mg/dl) | –3.7 ± 6.3 | –2.0 ± 5.5 |
| LDL (mg/dl) | 0.1 ± 22.3 | –2.8 ± 18.9 |
| AST (U/l)* | 4.8 ± 5.9 | 0.5 ± 10.3 |
| ALT (U/l)* | 12.3 ± 15.4 | 2.5 ± 20.1 |
| GGT (U/l)** | 26.1 ± 39.4 | –2.4 ± 22.2 |
| FBS (mg/dl)* | 4.2 ± 9.5 | –2.5 ± 11.4 |
| HbA1c (%)** | 0.1 ± 0.2 | –0.1 ± 0.3 |
| Insulin** | 1.6 ± 3.0 | –1.5 ± 3.1 |

*p<0.05, **p<0.01.

initial level. Monthly brief personal contact provided modest benefit in sustaining weight loss, whereas an interactive technology-based intervention provided early but transient benefit[5].

According to the guideline of obesity treatment 2006 published by the Japan society for the study of obesity, the 5% of reduction of body weight would be effective for the prevention of cardio-vascular

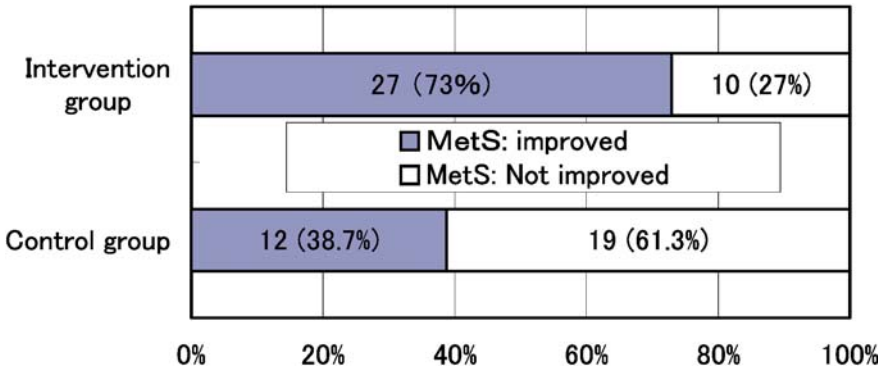


Figure 1. Effect of intervention; improvement of metabolic syndrome (MetS) $p<0.01$ (Chi square test).

diseases[6]. Our program was organized to meet this indication.

Of course, it is too early to assure the long term effectiveness of our program. Foreyt and Goodrick reported that the effectiveness of body weight reduction program was observed after 1 year of intervention but not after 30 months[7]. Now we continue to follow up these participants and would like to report the effectiveness after two years and more.

The health reform program in 2006 was the biggest one for the last 30 years in Japan. According to the plan a nation-wide health promotion program for healthier population will be introduced. This program might be a Japanese Disease Management program. It is no doubt that the Disease Management programs developed in USA will be applicable and effective for the Japanese situation. However, as the previous literatures have suggested, it is very important to know that various health promotion activities have been organized in the occupational setting and that these experiences would be very suggestive for developing the Japanese Disease Management programs[1)–3)]. In fact, after the introduction of new health promotion program, it has happened a tremendous confusion about how to implement the new program in the community setting. The know-how that established in the occupational setting will be very useful to ameliorate the current confusion.

## ❖ Acknowledgement

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